

Copyright
by
Lara Adrienne Latimer
2009

Self-efficacy for weight loss among multi-ethnic, low-income women:

A psychometric evaluation

by

Lara Adrienne Latimer, B.S.

Thesis

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Master of Arts

The University of Texas at Austin

August 2009

Self-efficacy for weight loss among multi-ethnic, low-income women:

A psychometric evaluation

**Approved by
Supervising Committee:**

Keryn Pasch

Lorraine Walker

Dedication

This is dedicated to Mom and Dr. Bell, who's continued support, encouragement, and guidance help me sustain my confidence and determination.

Acknowledgements

I would like to acknowledge Dr. Lorraine Walker for her help in the process of writing this thesis and for her unwavering advocacy and optimism. I would like to acknowledge Sunghun Kim for his extensive help with the statistical analyses. I would like to acknowledge Dr. Keryn Pasch for taking on this project with full dedication, despite the circumstances.

August 14, 2009

Abstract

Self-efficacy for weight loss among multi-ethnic, low-income women: A psychometric evaluation

Lara Adrienne Latimer, M.A.

The University of Texas at Austin, 2009

Supervisor: Keryn Pasch

The current study examined the psychometric properties of the Physical Activity and Nutrition Self-Efficacy (PANSE) scale. If proven a valid and reliable measure of self-efficacy for weight-loss behaviors, the PANSE scale may be useful in future research involving activity and nutrition for weight loss. This is particularly important given today's high prevalence of overweight and obesity, which may be curtailed with increased levels of activity and/or improved food-related behaviors. Initial reliability and validity testing was performed using a sample of 71 women low-income in central Texas. The average age of the participants was 24.5 ± 4.75 years; 35.2% were African American, 32.4% were Hispanic, and 32.4% were White. The women completed the 11-item PANSE questionnaire at baseline and at a 7-week follow-up data collection. Test-retest results provided reliability evidence, and there was sufficient evidence of internal consistency (Cronbach alpha = 0.89). Construct validity was established with significant correlations in expected directions with the Self Care Inventory, Perceived Stress Scale,

and Decisional Balance Inventory. The predictive validity of the PANSE scale for weight-loss at 7-week follow-up and program drop out was not established. Exploratory factor analyses revealed a 2-factor model for the 11 items. Initial examination provided evidence for the reliability and construct validity of the PANSE scale. Future testing of the scale should to be conducted with other populations to assess the generalizability of the PANSE scale outside of the population studied in the current report.

Table of Contents

List of Tables	xi
List of Figures	xii
Chapter 1 Overweight and Obesity.....	1
Risk Factors and Consequences.....	2
Social and Economic Costs.....	3
Chapter 2 Weight in Pregnancy and Postpartum	4
Recommendations and Prevalence	4
Postpartum Weight Retention: Biological Determinants.....	4
Postpartum Weight Retention: Social Determinants	6
Chapter 3 Self-efficacy	8
Self-Efficacy and Weight.....	9
Current Self-Efficacy Instruments: Dietary	10
Current Self-Efficacy Instruments: Physical Activity	12
Current Study Purpose	13
Chapter 4 Theoretical Background of Methods.....	14
Reliability Testing.....	14
Test-retest reliability	14
Internal consistency	14
Validity Testing	15
Construct validity.....	15
Content validity.....	16
Correlation with other variables.....	16
Predictive validity	17
Internal structure	17
Factor analysis	17

Chapter 5 Methods.....	19
Design	19
Sample Characteristics.....	20
Main Outcome Measure.....	22
Other Measures	22
Statistical Analyses	24
Reliability Testing.....	25
Test-retest reliability	25
Internal consistency	25
Validity Testing	25
Construct validity.....	25
Content validity.....	26
Correlation with other variables.....	26
Predictive validity	27
Internal structure	27
Factor analysis	27
Chapter 6 Results.....	29
Descriptive Statistics of PANSE.....	29
Test-Retest	30
Internal consistency	31
Construct Validity.....	31
Predictive Validity	32
Factor Analysis	34
Summary	36
Chapter 7 Discussion	37
Descriptive Results	37
Test-Retest Results.....	37
Internal consistency	38

Construct Validity	38
Predictive Validity: Baseline PANSE and Weight Change	40
Predictive Validity: Baseline PANSE and Drop Out	44
Factor Analysis	45
Strengths, Limitations, and Future Directions	46
Appendix A Permission Letter	49
Appendix B PANSE Scale	50
References	52
Vita	61

List of Tables

Table 1:	Demographic characteristics of participants	20
Table 2:	PANSE score means and standard deviations	29
Table 3:	Correlation Coefficients.....	32
Table 4:	Pattern Matrix	35

List of Figures

Figure 1:	Random Assignment and Data Collection Flowchart.....	21
Figure 2:	PANSE Distribution.....	30

Chapter 1: Overweight and Obesity

Overweight and obesity in the United States have reached alarming rates and are among the leading causes of preventable death (DeNaei *et al.*, 2009). According to the most recent data from the Centers for Disease Prevention and Control, approximately 63 percent of all American adults are overweight or obese, while 32 percent of these individuals are obese (National Health And Nutrition Examination Survey, 2004). In 2006, 29.4 percent of women in the United States were overweight and an additional 24.4 percent were obese (United States Department of Health and Human Services, 2008). Frighteningly, researchers have projected the overall prevalence of overweight and obesity for men and women to reach 70.8% by 2010 (Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008).

Ethnic disparities have been observed among women, with non-Hispanic white women having the lowest prevalence of obesity (30.7%), Mexican American women having the next highest rate (38.4%), and non-Hispanic black women having the highest prevalence (49.0%) (Hedley *et al.*, 2004). While Ogden and colleagues report no significant change in the obesity rate according to the 2005-2006 NHANES survey results, they do highlight the fact that non-Hispanic black and Mexican-American women are still more likely to be obese than non-Hispanic white women (Ogden, Carroll, McDowell, & Flegal, 2007).

Additionally, women of lower socioeconomic status (SES) may be at a greater risk of overweight and obesity. A systematic review of the relationship between socioeconomic status and obesity reports more negative associations in low socioeconomic women who live in more highly developed countries, such as the U.S.

(McLaren, 2007). In other words, those who tended to rank lower on SES indicators (e.g., education and occupation) also tended to have a larger body size. These numbers point to a need to examine possible causes of this problem and solutions that may guide future interventions.

Risk Factors and Consequences

Overweight and obesity are risk factors for many secondary health problems. One study examined the impact of overweight and chronic disease development over time within two large cohorts. These researchers report that men and women who were overweight were three times more likely to develop diabetes than those who had a normal-range body mass index (BMI) (Field *et al.*, 2001). Additionally, overweight women were significantly more likely to develop gallstones, high blood pressure, high cholesterol, and heart disease. Data from a study that examined the relation between body mass index and mortality in a large group of women enrolled in the Nurses' Health Study revealed that obese women (those with a BMI ≥ 29.0 kg/m²) had a mortality rate over twice that of their leanest peers (Manson *et al.*, 1995). It should be noted that the BMI categories used in this study were those established by Metropolitan Life Insurance Company and may not reflect current standards

Social and Economic Costs

The consequences resulting from the psychological anguish associated with overweight and obesity is of concern. The stigmatization of overweight individuals by their family and friends (Puhl, Moss-Racusin, Schwartz, & Brownell, 2008), and in job, school, and healthcare settings (Puhl & Brownell, 2001) has been noted. These findings point to the possibility of an alarming cycle. One study found that “eating more” and “refusing to diet” were coping mechanisms commonly used by obese people in response to social stigma regarding their weight (Puhl & Brownell, 2006). Vartanian and Shaprow (2008) report a significant, positive correlation between weight stigma and exercise avoidance ($r = .61$, $p < .001$). According to The Obesity Society, research shows that obese individuals have higher rates of depression and anxiety. Recent research shows that, among individuals who had a major bout of depression, those who were obese were more likely than non-obese participants to cope by overeating (Murphy *et al.*, 2009).

The economic burden of obesity continues to rise, and individuals may feel the strain, regardless of their weight status. Data from 1998 approximated obesity-related expenditure in the U.S. at \$78.5 billion, with federal dollars paying for half (Finkelstein, Fiebelkorn, & Wang, 2003). A recent study projects that the total direct health care costs attributable to overweight and obesity among U.S. adults will be \$175-\$194 billion by 2010 and \$394-\$438 billion by 2020 (Wang *et al.*, 2008). Given the dismal state of the nation’s economy, particularly related to health care, addressing the rising cost of obesity is necessary.

Chapter 2: Weight in Pregnancy and Postpartum

Recommendations and Prevalence

The Institute of Medicine's (IOM) 1990 recommendation states that women of normal body mass index range should gain 25-35 pounds during pregnancy. While the guidelines for gestational weight gain have been recently updated to reflect population changes and research findings, the recommendation for normal BMI range women has remained the same (IOM, 2009). Women who gain more than the recommended amount during pregnancy may be at a greater risk of developing pregnancy-related complications such as gestational diabetes, preeclampsia, labor and delivery complications, and unsuccessful breastfeeding (IOM, 2009). The IOM (1990) indicates that pre-pregnancy BMI is a determinant of gestational weight gain. According to 2007 data on maternal health indicators, 42.8% of women gained more than the recommended amount, regardless of their pre-pregnancy weight BMI category (Centers for Disease Prevention and Control, 2007). Ethnic differences are also noted in this report: 47.4% of non-Hispanic white women, 42.4% of non-Hispanic black women, and 38.2% of Hispanic women gained greater than the ideal recommended amount of gestational weight in 2007 (CDC, 2007).

Postpartum Weight Retention: Biological Determinants

Gestational weight gain is among the factors affecting postpartum weight retention (Gunderson & Abrams, 2000). In a group of Brazilian women, those who gained more than the Institute of Medicine's gestational weight gain recommendation had

greater weight retention, regardless of pre-pregnancy body mass index (Kac, Benicio, Velasquez-Melendez, Valente, & Struchiner, 2004). This same study reports a significant positive association between pre-pregnancy body fat percentage and weight retention, although there was a negative association between baseline BMI and weight retention.

Additionally, gestational weight gain may predict postpartum weight gain, which is especially worrisome if the gain is in addition to retained weight. Gestational weight gain showed a positive, significant relationship with maternal weight gain at 6 and 18 months postpartum (Walker, 1996). A longitudinal study that examined weight gain among a group of middle-class white mothers reports significantly higher weight gain over a decade in those who gained more than the recommended amount during pregnancy (Rooney & Schauburger, 2002). Results from this study also point to the importance of losing pregnancy-related weight, regardless of the total amount of gestational weight gained. At a 10-year follow-up, mothers who had not lost the weight gained during pregnancy by 6 months postpartum gained over 3 times more weight than mothers who lost pregnancy-related weight 6 months after the baby's birth.

A review of evidence regarding postpartum weight retention reports that a pre-pregnancy overweight status increases the risk that a woman will experience greater postpartum weight retention (Gore, Brown, & Smith-West, 2003). Specifically, Ohlin and Rossner (1990) found a positive, however non-significant correlation, between 1-year weight retention of ≥ 16.0 kg or more with a pre-pregnancy BMI of ≥ 26.0 kg/m². Linne, Dye, Barkeling, and Rossner (2003) examined data from the Stockholm Pregnancy And Women's Nutrition study and found that women who weighed more pre-pregnancy also

weighed significantly more at 15-year follow-up than mothers who weighed less at pre-pregnancy. It should be noted, however, that the women who weighed more over time had a higher pre-pregnancy *weight*, but were not necessarily overweight. Pre-pregnancy weight as a determinant of long-term weight retention is especially disconcerting due to the disproportionate trends of overweight and obesity among racial minority and low socioeconomic groups. Higher pre-gravid levels of overweight may be setting the stage for a discouraging cycle: disproportionate gestational weight gain may lead to an increased level of pregnancy-associated weight retention which, in turn, increases pre-gravid weight for subsequent pregnancies.

Postpartum weight retention is of concern, because a trajectory may develop that perpetuates future weight gain and retention. Rossner and Ohlin (1995) report that pregnancy-associated weight gain most strongly predicted weight retention at 1 year follow up among a large group of Swedish women. The women who retained the most weight also noted changes in activity levels and diet during pregnancy, suggesting that pregnancy may have been a catalyst for unhealthy lifestyle alterations that continue during postpartum.

Postpartum Weight Retention: Social Determinants

As expected, given the aforementioned ethnic and socioeconomic status disparities in the prevalence of overweight in the United States, significantly higher postpartum weight retention has been found among low socioeconomic groups (versus higher SES groups), despite non-significant differences in gestational weight gain, which may be indicative of a postnatal emergence of SES differences in retention (Shrewsbury,

Robb, Power, & Wardle, 2009). This may be because low SES women are also less likely to hold a positive attitude regarding weight loss and less likely to engage in weight reducing practices (Shrewsbury *et al.*, 2009).

Ethnic differences for pregnancy-related weight gain have been found. One study found that black women were more likely than white women to retain pregnancy-related weight, with a median weight retention 3 times higher than that of white women (Keppel & Taffel, 1993). Parker and Abrams (1993) found that black mothers were twice as likely as white mothers to retain at least 20 lbs, despite a normal range weight status pre-pregnancy. Weight gain over time likely affects ethnic groups unequally. Over a 5-year period, African American women in one study gained twice as much weight as White women, regardless of parity (Smith *et al.*, 1994). Although disturbing, these findings are not surprising, given the higher levels of obesity among African American women as compared to Anglo or Hispanic women.

Chapter 3: Self-efficacy

Albert Bandura's Social Cognitive Theory (SCT) is a behavioral change theory that addresses the personal and environmental determinants that affect action (Bandura, 1986). SCT includes the construct of perceived self-efficacy, which refers to an individual's belief about their capabilities to produce a certain outcome (Bandura, 1994). The belief in one's capabilities can affect many aspects of motivational and cognitive decisions. According to Bandura (1977), a person's evaluation of his/her self-efficacy related to a particular situation, in combination with their outcome expectations, will partly determine whether or not they choose to engage in certain behaviors. He posits, however, that self-efficacy is a greater determinant of action, because outcome expectations are dependent on how capable an individual feels (Bandura, 1986).

According to Bandura, self-efficacy is not a global sense of self, but a situation-specific evaluation of an individual's perceived ability to execute actions necessary to complete a behavior. Oftentimes this behavior is a component of a larger outcome, as in the case with weight loss. He advises it is critical that self-efficacy is measured in terms related to a specific skill (Bandura, 2006). An individual may feel very capable to perform behaviors in some domains, while concurrently feeling much less confident in others. This is important in many behavioral contexts, including behaviors related to weight loss, as is discussed in the current paper.

Self-Efficacy and Weight

Excess weight is the result of a calorie imbalance; overweight individuals consume more than they expend. Genetic, environmental, and behavioral factors may all play a role, but the latter two areas provide the most promising routes for prevention and treatment. The United States Department of Health and Human Services identifies self-efficacy as a predictor of weight-loss success (USDHHS, 2000). In practical terms, increasing self-efficacy to eat healthier (including a variety of food-related behaviors) and engage in more activity may lead to a change in weight status.

One weight loss study reported that women who had higher levels of self-efficacy lost significantly more weight, almost twice as much, as those who were less efficacious (Dennis & Goldberg, 1996). Researchers attempting to predict short-term weight loss with four health behavior theories found that the construct of self-efficacy for weight management and exercise most significantly predicted weight change at 4 months among overweight and obese women (Palmeira *et al.*, 2007). Another study found a significant inverse relationship between women's BMI and self-efficacy for preventing weight gain, exercising regularly, and eating healthily, with increased BMI associated with decreased self-efficacy (Ball & Crawford, 2006). At 2-year follow-up among the same group of women, increased self-efficacy for preventing weight gain and increased self-efficacy for healthy eating showed a significant negative relation to weight change. In other words, women who had higher initial self-efficacy regarding these areas gained less weight over time.

Krummel, Semmens, Boury, Gordon, & Larkin (2004) found that avoidance of high fat foods and increased fiber intake were both positively correlated ($p < .01$; $p < .05$

respectively) with increased self-efficacy to use food labels and choose lower fat restaurant meals among a group of low-income mothers. Another study reports increased self-efficacy in different mood states significantly affected low-fat food substitution and avoidance of fried foods in low-income African American and White women (Chang, Brown, Baumann, & Nitzke, 2008). The obese women involved in a caloric-reducing weight loss study lost significantly more weight if they had higher levels of self-efficacy regarding eating behavior (Wamsteker *et al.*, 2005).

Data from a diverse sample of women ages 20-50 years showed a strong positive association between exercise self-efficacy and actual physical activity levels (Eyler *et al.*, 2003). While this association was consistent among most of the samples, there was not an observed relationship between self-efficacy and activity levels in urban Latina and African American women. However, for rural African Americans and some Latinas, knowing people who exercised showed a significant and positive correlation with physical activity levels. African American women in rural and mixed settings were more likely to be active if they reported seeing people in their neighborhood who exercised. This may reflect Bandura's idea of building self-efficacy through vicarious experience. If these women viewed people they knew who or people they saw who exercised as similar to themselves, it may have aided in enhancing their own self-efficacy for activity.

Current Self-Efficacy Instruments: Dietary

Validated measures of self-efficacy related to dietary behaviors have been used in other studies. A sample of female college students served as the population for the development and validation of a 25-item Eating Self-Efficacy Scale (ESES) in one study

(Glynn & Ruderman, 1986). The ESES contains items that address eating while experiencing negative affect and while in positive social situations. The 20-item Weight Efficacy Life-Style Questionnaire (WEL) was adapted from a smoking confidence questionnaire and measures an individual's resistance to eat in certain positive and negative situations. It was validated with a group of obese women, primarily over the age of 40, involved in a workplace weight loss program (Clark, Abrams, Niaura, Eaton, & Rossi, 1991). Well-educated, older women served as the sample for the development of an 18-item instrument that measures self-efficacy to reduce dietary fat, which demonstrated sound reliability and validity (Kristal, Shattuck, & Henry, 1990). The Factors Affecting Diet, Exercise, and Stress Management (FADESM) scale, based upon several constructs of Social Cognitive Theory, proved valid among a group of low-income African American and White mothers (Chang, Brown, & Nitzke, 2008).

A 10-item questionnaire about reducing dietary fat while experiencing positive or negative affect and when fattening foods are readily available was validated among a group of low-income African American and White women (Chang, Nitzke, Brown, Baumann, & Oakley, 2003). A scale was constructed to measure, along with other constructs, self-efficacy among a clinical population of individuals who have undergone surgical treatment for obesity. The complete and valid scale consists of 46 items, with 3 pertaining to self-efficacy related to eating habits/behaviors (Larsen & Geenen, 2000). The content of another questionnaire consists of 7 items that measure self-efficacy to choose fruits and vegetables in a variety of circumstances. This instrument was found to be valid among a sample of limited resource women (Townsend & Kaiser, 2005). Stich, Knauper, and Tint (2009) structured a Scenario-Based Dieting Self-Efficacy Scale

(DIET-SE), which consists of scenario-based items that require participants to rate their confidence to engage in behaviors that promote weight loss. The 11-item questionnaire, while considered valid, was not tested with a low-income or multiethnic population.

Current Self-Efficacy Instruments: Physical Activity

Saunders and colleagues developed a reliable and valid measure of physical activity self-efficacy among children (Saunders *et al.*, 1997). Laffrey and Asawachaisuwikrom (2001) developed a valid, 11-item questionnaire assessing exercise self-efficacy in a population of older Mexican American women. The Self-Efficacy for Exercise scale was developed for evaluation with older adults. This measure demonstrated sufficient reliability and validity among a group of men and women with a mean age of 85 years (Shaughnessy, Resnick, & Macko, 2004). Another Self-Efficacy for Exercise Scale was developed by Resnick and colleagues for use with older, low-income adults, and has been validated with multiethnic samples (Resnick, Luisi, Vogel, & Junaleepa, 2004). The 9-items used in the scale address an individual's confidence in their ability to exercise when facing certain barriers to activity. Marcus, Selby, Niaura, and Rossi (1992) developed a measure of physical activity self-efficacy for use among a sample of men and women governmental and hospital employees. A 20-item instrument was developed specifically to assess stage-specific (based on the Transtheoretical Model of Change) self-efficacy for physical activity (Masse, Heesch, Eason, & Wilson, 2006). The researchers found the measure to be valid with a sample of African American and Hispanic women ages 40-70 years.

Current Study Purpose

After conducting a literature review to find available instruments that measure self-efficacy for diet and exercise behaviors related to weight loss, it was determined that a new instrument should be created for several reasons. First, the new instrument was developed to fill a void in weight-related self-efficacy research instruments for low-income, multiethnic, postpartum women. While studies with low-income and/or multiethnic women have utilized the instruments listed above, these measures have not necessarily been validated with a low-income, multiethnic group. It is also necessary to have a parsimonious scale to accurately measure the construct, and the wording of the items needs to be clear and simple. With this in mind, the new scale also needs to cover a broad range of areas that reflect diet and activity behaviors associated with weight loss. Previous instruments have focused on one aspect of weight-related, situational eating, or activity self-efficacy. Additionally, the new measure attempts to combine the food and activity items in one scale. This will allow researchers to use one instrument (rather than several) to tap into the concept of self-efficacy for weight loss behaviors among low-income women for future studies. Therefore, the purpose of this study was to develop and validate a new instrument to measure physical activity and dietary behavior self-efficacy among a group of low-income, multiethnic postpartum women.

Chapter 4: Theoretical Background of Methods

Norbeck (1985) states that, at least, the following should be included in any report on instrument development: test-retest reliability, internal consistency reliability, one type of construct validity, and one type of content validity. The current study uses this as a guide, and the methodological criteria are listed in the following section.

Reliability Testing

Test-retest reliability

Test-retest reliability refers to the stability of a participant's response to a measure and assumes there has not been an intervention that would change an individual's response. A test-retest coefficient is calculated to represent the correlation between a measure at different assessment occasions with the same sample (Netemeyer, Bearden, & Sharma, 2003). This coefficient can help researchers determine to what degree a measure may reflect a particular construct, and can also give information about the generalizability to subsequent assessment times with a specific sample.

Internal consistency

Internal consistency is concerned with how well the individual items correlate with other individual items that attempt to measure the same latent variable. Although it is not possible to examine the direct correlation between a latent construct and a particular item, by examining the inter-item correlation we can determine if the

individual items are highly correlated with each other. If this is high, we can assume that all items are measuring the same construct, self-efficacy in this instance (DeVellis, 1991).

Cronbach's coefficient alpha represents the extent to which a set of items attempting to measure a single construct are interrelated (Netemeyer *et al.*, 2003). Alpha symbolizes the proportion of the scale's total variance that is attributable to the true score of the latent construct being measured, which does not include variance related to error.

According to Netemeyer and colleagues (2003), total inter-item correlations may also help bolster internal consistency. High item-total correlations provide evidence that each item is contributing to the total score of the instrument. Alternately, a low correlation indicates that an item may not be measuring the same construct as other items in the scale. This helps ensure that the items you believe measure a particular construct are in fact doing so. Another useful analysis is the "alpha if deleted" test. This reveals what the overall change in Cronbach's alpha if a particular item is deleted. If a higher alpha is observed with an item deleted, removing that item may be considered.

Validity Testing

Construct validity

Cook & Beckman (2006) recommend using the overarching term of "construct validity" to frame all validity testing related to a particular instrument. This is based on the rationale that scores resulting from a particular measure are only useful to the extent in which they reflect a construct. Construct validity results are specific to elements such as the construct, population, and context in which the instrument was tested (Haynes, Richard, & Kubany, 1995). An adapted version of a list provided by Messick (1989)

provides the framework for examination of construct validity. In order to gather evidence to support construct validity, some of the categories Messick suggests are: content, relations to other variables, and internal structure. For the purposes of the current paper, these 3 categories will serve as the analyses for construct validity.

Content validity

According to Haynes and colleagues (1995, p. 239), a working definition of content validity is “the degree to which elements of an assessment instrument are relevant to and representative of the targeted construct for a particular assessment purpose.” Elements of the instrument refer to the specific content of individual items, response formats, and directions to respondents (Haynes *et al.*, 1995). These authors also stress the fact that content validity has implications for behavioral predictions based on measurement outcomes. The initial phases of scale development require attention to forming items that reflect the domain being measured. Internal consistency, inter-correlations with other items, and factor structure are examples of qualitative tests for content validity assessment.

Correlation with other variables

Construct validity is also concerned with the degree to which an instrument correlates with other measures in an expected manner. Expected correlation or lack of correlation with other measures supports the validity of an underlying construct. Based on this, we chose the following three instruments (described above) from our battery of

questionnaires to examine the construct validity of the PANSE: Self-Care Inventory, Perceived Stress Scale, and Decisional Balance Inventory.

Predictive validity

This term implies that a particular measure can predict a subsequent outcome. Future behavior may be forecasted based on the response outcome of a psychosocial measure. Researchers may develop a scale to measure a specific construct and choose an outcome that correlates with the construct in some way. Changes in the particular outcome measure may validate a particular measure as an appropriate assessment of a construct.

Internal structure

Reliability, discussed above, and factor analysis, discussed below, are generally considered sufficient means of determining the validity of the internal structure of an instrument (Downing, 2003; Floyd & Widaman, 1995).

Factor analysis

Exploratory factor analyses were conducted to identify an underlying framework of the instrument. Floyd *et al.*, (1995) provide a working definition of the type of exploratory analyses performed. An instrument that is developed to measure a particular latent variable is analyzed to identify dimensions (representing theoretical constructs) that serve as subscales for the instrument. Factor analyses may provide insight into variables that contribute to the structure of an instrument. Additionally this can aid in the

identification of theoretical constructs that are reflected in the individual item responses (Floyd *et al.*, 1995).

Different rotational methods may be used in factor analyses to determine the appropriate number of factors. Orthogonal rotation indicates that the identified factors are statistically independent. Oblique rotation, on the other hand, assumes that the latent variables represented by each factor may be related in some way. Therefore if an orthogonal rotation is performed initially and inter-correlations between factors are detected, an oblique rotation may be performed. According to DeVellis (2003), simplicity is sacrificed when oblique rotation is used instead. The sum of each factors' separate effect equal the factors combined effects with an orthogonal rotation, but this is not the case with oblique. The dimensions represented in each factor are not entirely uncorrelated, thus some overlap in the information provided by the factors from an oblique rotation most likely occurs.

Chapter 5: Methods

Design

The psychometric testing of the Physical Activity and Nutrition Self-Efficacy Scale (PANSE) occurred within the context of a randomized pilot test of a weight loss intervention for low-income new mothers. These women were part of The Austin New Mothers Study II, a larger project to help mothers lose weight during their first year postpartum.

Women were eligible to participate in the study if they (a) were at 6 weeks to 12 months postpartum (b) were overweight ($\text{BMI} \geq 25\text{kg/m}^2$) (c) were at least 5 kg over self-reported pre-pregnant weight (d) had their prenatal care covered by Medicaid (e) were 18 years of age or older (f) self-identified with one of the following ethnicities: Hispanic, African America, or Anglo (g) were English-speaking (h) had a healthy, singleton birth at most recent delivery (i) had a term, low risk pregnancy (≥ 37 weeks gestation) (j) had a parity of 1-3 and (k) had a phone or pager. Women were ineligible for the study if they had any chronic health conditions such as heart disease, diabetes, HIV/AIDS, renal disease, or mental illness treated by drugs likely to induce weight gain.

During the 13-week intervention the PANSE was completed with paper-and-pencil method by participants at weeks 0, 7, and 13. For this analysis, data from weeks 0 and 7 will serve as data sources to reduce the effects of attrition and maximize the number of participants.

Sample Characteristics

The sample included low-income women in Austin, Texas and the surrounding area. Once eligibility was determined and enrollment was complete, the women were randomly assigned to a treatment or wait-list control group. Descriptive statistics of the sample are in Table 1, and randomization results appear in Figure 1.

Table 1: Demographic Characteristics of Participants (n = 71)		
	Mean (SD)	%
Age (in years) (n = 69) ^a	24.55 4.75	
Race/Ethnicity		
African-American		35.2
Anglo		32.4
Hispanic		32.4
Education		
Partial High School		16
High School Graduate		44
Partial College		34
College Graduate		6
Graduate Degree		1
Income (n = 66) ^b		
<\$15,000		47
\$15,000-\$29,999		36
\$30,000-\$44,999		11
\$45,000-\$59,999		5
\$60,000 or above		2

- | |
|--|
| <p>a. 2 participants omitted the age item</p> <p>b. 5 participants omitted the income item</p> |
|--|

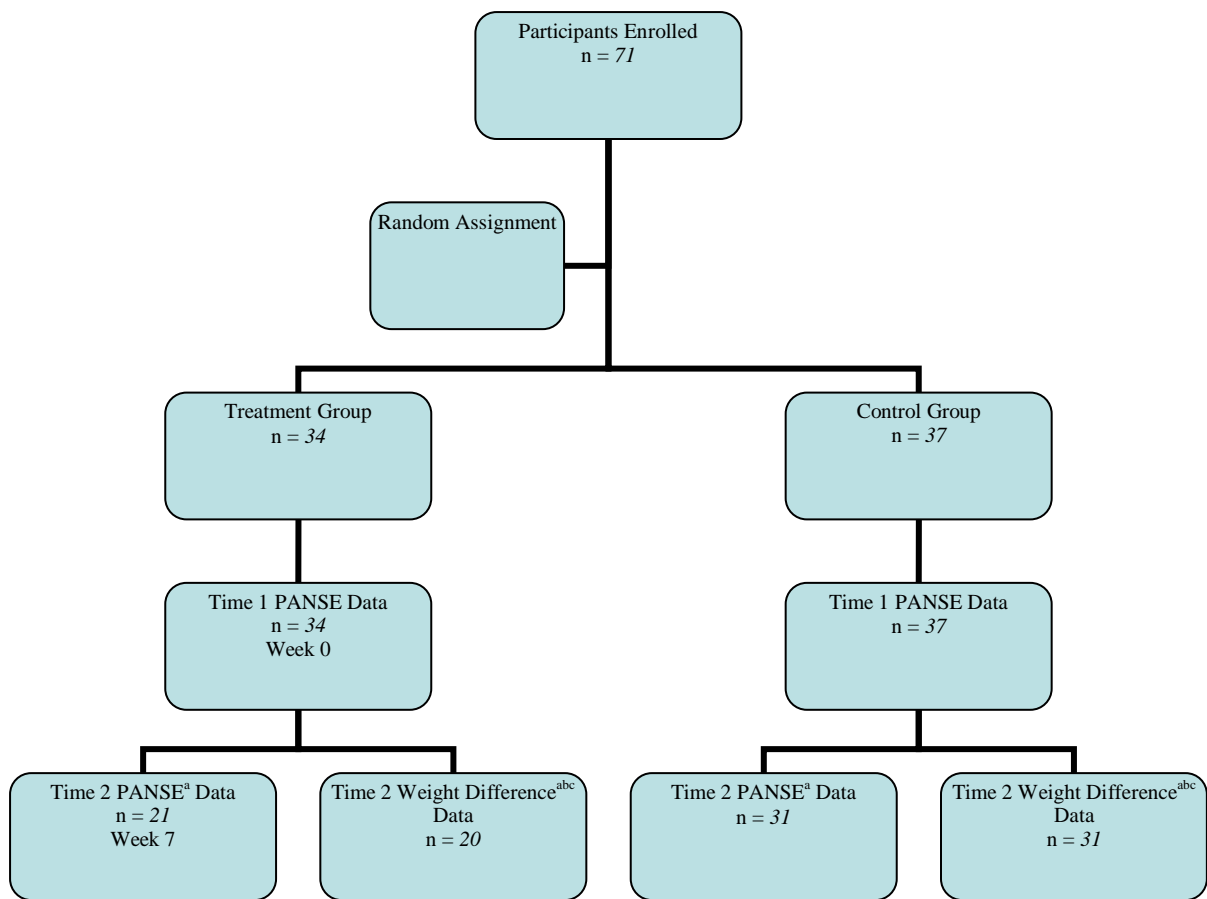


Figure 1. Random Assignment and Data Collection Flowchart

- a. Time Data Collected 7 weeks after Time1
- b. Weight Difference = Time 2 measured weight – Time 1 measured weight (i.e., Week 7 weight – Week 0 weight)
- c. Time 2 Weight Difference data proxy for drop out rate. Those without Time 2 Weight Difference data were considered “drop-outs.”

Main Outcome Measure

The PANSE scale developers used the self-efficacy website available through Emory University (<http://www.des.emory.edu/mfp/self-efficacy.html>), which is an extensive resource on the construct of self-efficacy that provided a sound foundation for a new instrument (Bandura, 2006). The following working definition of self-efficacy was used in the development phase: the degree of confidence that women have regarding their capabilities to enact nutrition and physical activity behaviors related to weight loss. On a scale of 1 (not at all) to 9 (completely), individuals were instructed to circle the number that corresponded with how confident they felt to do certain physical activity and food-related behaviors. An example of an eating behavior question is: “How confident are you that you can reduce your portion sizes at meals and at snacks each day?” A sample item for activity is: “How confident are you that you can increase time spent in physical activity while at home, given your current family responsibilities?” A complete version of the PANSE is located in Appendix B of this document. This response format differed from that recommended by Bandura (2006), but was used because of similarity to other instruments the participants were completing to reduce confusion in response format.

Other Measures

Self Care Inventory (SCI) (Pardine, P. (n. d.)) was used to measure health behaviors. Originally a 42-item instrument, 15 items were chosen for this study. The instrument contains questions regarding positive and negative health practices pertaining to dietary, activity, alcohol, and smoking practices that may affect an individual’s

physical well being. For questions 1-12 the individual is asked to report how frequently they have engaged in a particular behavior during the past month, on a scale of 0 (rarely or never) to 3 (very often). The three questions relating to smoking and alcohol had different response formats that were recoded to fit the 3-response format of the other questions. An example of a question is “During the past month, how often did you snack on junk foods?” Higher scores on this measure indicate higher levels of unhealthy behavior. Cronbach alpha for this measure ranged from .78 to .85 in the Austin New Mothers Study (Walker *et al.*, 2004). Cronbach alpha results in the present measurement study resulted in a .697 alpha level.

Participants in the current study were asked to complete the above instrument at Times 1 (week 0) and 2 (week 7). Therefore, we expected SCI scores to negatively correlate with PANSE scores, indicating an individual may feel less efficacious regarding activity and diet if they are engaging in more unhealthy behaviors.

Perceived Stress Scale (PSS) (Cohen & Williamson, 1988) was used to measure postpartum perceived stress. This is a 10-item instrument (adapted from the original 14-item instrument) that measures stress as defined as feeling overwhelmed, overloaded, and out of control about general life events. Respondents are asked to indicate how often (0=never to 4=very often) in the past month they have had certain feelings and thoughts. An example of an item is “In the last month, how often have you felt confident about your ability to handle your personal problems?” Higher scores indicate higher levels of perceived stress. Roberti, Harrington, and Storch (2006) report a reliability coefficient for the 10-item version of .89 with a sample of college students

Participants in the current study were instructed to complete the PSS at Times 1 and 2. A higher score on the Perceived Stress Scale indicates a higher level of stress, thus we expected to see a high PSS score to correlate with a low PANSE score. An individual who feels more stressed may have less self-efficacy to make positive changes in diet and activity.

Decisional Balance Inventory (DBI) (O'Connell & Velicer, 1988) is a 20-item measure of the beliefs of the pros and cons of losing weight. Ten items represent the pros of weight loss and 10 items represent the cons of weight loss. The final score is a pro T-score minus a con T-score, and higher score indicates more pros for weight loss. Walker (1999) tested the internal consistency of this measure with a group of postpartum women and reports a Cronbach alpha value of .93 for the pro subscale and .83 for the con subscale.

This measure was completed by participants in the current study at Time 1 only. An individual who identifies more pros with weight loss than cons is expected to have a higher self-efficacy to change dietary and exercise behaviors.

Statistical Analyses

SPSS version 16.0 was used for descriptive statistics, correlations, and factor analyses.

Reliability Testing

Test-retest reliability

Data for the Control group from Time 1 (baseline) and Time 2 (7 week follow up) were analyzed. Time 1 PANSE scores were compared with Time 2 PANSE to obtain a Pearson correlation coefficient in order to determine if the results at one time are replicable at another time.

Internal consistency

A Cronbach's alpha coefficient was calculated with data from Treatment and Control group PANSE data at Time 1. An alpha coefficient ≥ 0.70 is suggested for sufficient evidence of internal consistency (Nunnally & Bernstein, 1994).

Item-total statistics were calculated from Treatment and Control group PANSE data at Time 1 in order to evaluate how each item correlated with the total score. Item-total statistics also allowed for the examination of the change in Cronbach's alpha if a particular item was deleted.

Validity Testing

Construct validity

In the current study, the analyses run for correlation with other variables, predictive validity, and factor analysis (described below) will serve as evidence of construct validity.

Content validity

Content validity should be addressed in the early stages of scale development, according to Netemeyer and colleagues (2003). Qualitative procedures were used to assess the content validity of the PANSE scale. The construct of self-efficacy, particularly regarding eating and activity behaviors, was carefully defined before scale development began (definition is stated above). All items for the PANSE were evaluated by the test developers to determine if they were representative of self-efficacy for weight loss behaviors. Specifically, they looked at the representation of the different dimensions (diet and activity) within the scale.

Correlation with other variables

PANSE scores for the Treatment and Control groups from Time 1 were used in the correlation analyses with the other measures. Because the Self Care Inventory examines the frequency of negative health behaviors, it was hypothesized that PANSE scores would increase as Self Care Inventory scores decreased. This would indicate an increase in self-efficacy correlates with a decrease in poor health behaviors. A decrease in the Perceived Stress Scale scores was hypothesized to correlate with an increase in PANSE scores. A higher score on the Decisional Balance Inventory (which indicates more pros associated with weight loss) was hypothesized to correlate with higher PANSE scores. Time 1 correlations between the following measures and PANSE were determined from Control and Treatment group data.

Predictive validity

In this study, PANSE scores for the Treatment group at T1 were hypothesized to predict weight loss and drop-out rates at T2. Therefore, a Pearson correlation coefficient was calculated for Treatment group PANSE data at Time 1 and Treatment group Weight Difference (measured weight at time 2 – measured weight at time 1) at Time 2.

A participant was considered a “drop out” if she did not have Time 2 weight data. Participants were assigned a “0” if they had not dropped out at Time 2 and a “1” if they had dropped out. T-tests were conducted to see whether the average PANSE score at Time 1 for those who dropped out were different than average PANSE score at Time 1 for those who did not drop out. First, analyses were run for Treatment and Control group PANSE data at Time 1 and Treatment and Control group drop out data at Time 2. Next, a separate t-test was conducted with only Treatment group PANSE data at Time 1 and Treatment group drop out at Time 2. Then another t-test was conducted with only Control group PANSE data at Time 1 and Control group drop out at Time 2.

Internal structure

The Cronbach’s alpha calculation and item-total statistics (described above), and factor analyses were conducted to reveal the internal structure validity of PANSE.

Factor analysis

Varimax and oblique 2- and 3-factor solutions were explored in an effort of find which rotation resulted in items having high loadings ($\geq .40$) on no more than one factor. After

the factor loadings were determined, the items were examined to identify what communalities were apparent, and factors were named accordingly.

Chapter 6: Results

Descriptive Statistics of PANSE

The means and standard deviations for the PANSE are listed in Table 2. Additionally, distribution results showed that each individual PANSE item was not normally distributed ($p < .01$), and all items tended to be negatively skewed. However, the overall distribution of PANSE was not significantly skewed ($p = .200$). The PANSE distribution is shown in Figure 2. The reading level of the PANSE scale, assessed by Microsoft Word, is at a 9.9 grade level. The possible PANSE scores range from 11 to 99.

Table 2: PANSE score means and standard deviations			
PANSE Data	Group	Mean	Standard Deviation
Time 1	Treatment	66.68	16.53
	Control	74.14	12.74
Time 2	Treatment	72.29	14.71
	Control	65.95	17.19

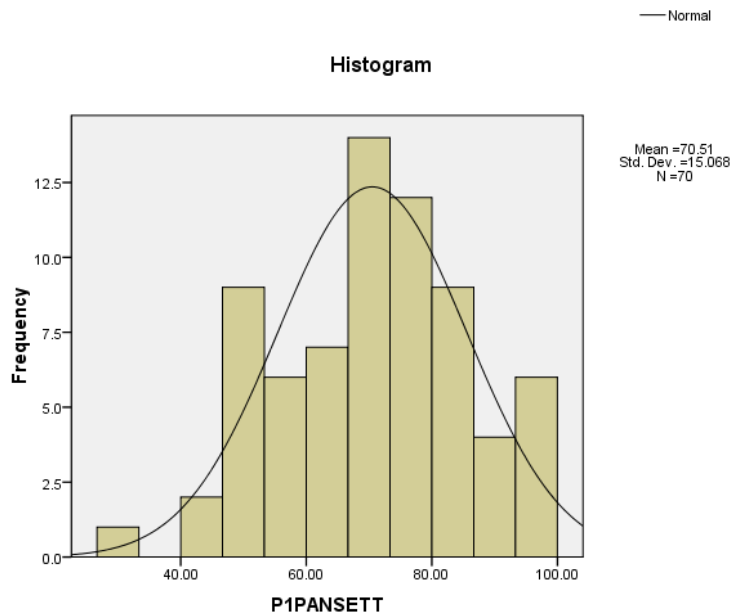


Figure 2: PANSE Distribution

Test-Retest

The reliability analysis for PANSE at Time 1 and PANSE at Time 2 among the Control group initially yielded a Pearson Correlation Coefficient of 0.548 ($p < 0.01$). However, this number included one outlier, and given the small sample size, the analysis was rerun without the outlier to determine its effect on the overall test-retest reliability. The coefficient between the two PANSE scores was 0.623 ($p < 0.01$) when the outlier was removed.

Internal Consistency

Internal consistency data analyses were run for combined Treatment and Control group PANSE data at Time 1. A Cronbach alpha coefficient of .89 was sufficient evidence for internal consistency of the PANSE scale, according to the predetermined alpha criterion of $\geq .70$ (Nunnally *et al.*, 1994). Item-Total Statistics revealed that all inter-item correlations were positive and ranged from .488 to .733. These results demonstrate high inter-item consistency, based on the criteria of .30 as an acceptable corrected item-total correlation (Nunnally *et al.*, 1994). This correlation indicates that each individual item contributes well to the total score of PANSE for each respondent. The PANSE scale exhibited “alpha if deleted” coefficients ranging from .872 to .887 for all 11 items. It appears that deletion of any 1 item would not improve the overall alpha coefficient for the PANSE scale, which indicates that all items work well for the PANSE scale score.

Construct Validity

Analyses to establish construct validity conducted on Treatment and Control data from Time 1 resulted in the Pearson correlation coefficients reported in Table 3. The resulting data reflects the correlations between the PANSE and measures with hypothesized relationships to the construct of self-efficacy. All measures were found to be correlated with PANSE in the expected directions, with a significance level of $p < .05$.

Table 3. Correlation coefficients		
Measure	Pearson Correlation with PANSE	<i>p</i> -value
Self Care Inventory	-0.334	0.005
Perceived Stress Scale	-0.242	0.044
Decisional Balance Inventory	0.257	0.036

Predictive Validity

The Pearson correlation for PANSE scores at Time 1 and Weight Difference at Time 2 (measured weight at Time 2 – measured weight at Time 1) with Treatment group data was .129 ($p > .05$). This result indicates that participants who had higher self-efficacy at Time 1 showed a pattern of weight gain at Time 2 (7 weeks later), although the pattern was not statistically significant. Therefore, it does not appear that baseline PANSE is predictive of weight loss over the 7-week period between Time 1 and Time 2 for the Treatment group.

Correlations were conducted between PANSE scores at Time 1 and Weight Difference at Time 2 (measured weight at Time 2 – measured weight at Time 1) with Control group. This resulted in a Pearson correlation of .082 ($p > .05$). Similar to the Treatment group data, this correlation indicates that Control group participants who had higher PANSE scores at Time 1 displayed a pattern of weight gain at Time 2 (7 weeks later), although this relationship was not statistically significant. Thus, we cannot conclude that PANSE is predictive of weight loss a 7-week period for the Control group.

T-tests results with all participants (Treatment and Control) for PANSE data at Time 1 and drop out at Time 2 showed that participants who dropped out of the study

tended to have lower PANSE scores at Time 1 than those who stayed in the study. The mean PANSE score for those who dropped was 67.42 and 71.67 for those who stayed. It should be noted, however, that these differences were not statistically significant ($t_{df=68} = 1.05, p = .298$). Therefore, we cannot conclude that participants who had lower self-efficacy for weight loss-related behaviors at Time 1 were more likely to drop out of the study during the 7 week period between Times 1 and 2.

Another t-test was run with only Treatment group PANSE data at Time 1 and drop out at Time 2 among this same group. Results showed, again, that participants who remained in the study at Time 2 tended to have higher Time 1 PANSE scores than those who dropped out at Time 2. Again, this trend was not statistically significant ($t_{df=32} = .781, p = .441$), so we cannot definitively state that participants in the Treatment group who displayed lower self-efficacy for weight loss-related activities at Time 1 were more likely to drop out of the study by Time 2 (7 weeks later).

Analyses were conducted between only Control group PANSE scores at Time 1 and drop out for the same group at Time 2. It should be noted that the sample size for the “drop outs” from the Control group was very small ($n = 6$), which is too small to obtain meaningful results, therefore these analyses were exploratory in nature. The direction of the mean difference was opposite from the expected: PANSE scores at Time 1 for those members of the Control group who dropped out of the study at Time 2 were higher than Time 1 scores for those who stayed in. Similar to the previous two t-test results, the mean differences in PANSE scores at Time 1 between those who dropped out and those who stayed were not statistically significant ($t_{df=34} = -.214, p = .832$), therefore we cannot confidently state that individuals in the Control group who had higher self-efficacy for

weight loss behaviors at Time 1 were more likely to drop out of the study at Time 2 than those members of the Control group who had lower self-efficacy scores at Time 1.

Factor Analysis

Initial Kaiser-Meyer-Olkin Measure of Sampling Adequacy resulted in a value of 0.86 ($p < .01$), indicating an adequate ratio of sample size to number of items on the PANSE to get valid factor analysis results. When the factor analysis was conducted on the 11-item PANSE questionnaire, Varimax orthogonal rotation method with 2 or 3 factors did not result in items having high loadings ($> .40$) on only one factor, which is indicative of some items sharing variance with multiple factors and not reflecting clearly defined factors. When a factor analysis was conducted with the oblique rotation method with 2 factors, items had high ($> .40$) loadings on either one or the other factor but not both, therefore the 2 factor model with oblique rotation was chosen for the purposes of this paper. Factor loadings are listed in Table 4.

Examination of eigenvalues showed that the first 2 exceed 1.0: the two- factor solution that resulted from this analysis had a combined explained variance of 59.8%. In addition to eigenvalues, the scree plot was examined to determine the number of factors and also indicated a 2-component solution should be investigated. After examining the factor loadings, it was determined that Factor 1 related to dietary behaviors for weight loss and Factor 2 related to physical activity for weight loss. Items 1 through 8 and item 11 loaded highly on Factor 1 and address an individual's confidence to engage in certain food-related behaviors which are beneficial to weight loss, such as reducing fat in cooking and increasing fruits and vegetables. Items 9 and 10 load highly on Factor 2 and

address a person's confidence to increase physical activity, which may also aid in weight loss.

While most items loaded on only one of the factors ($> .40$), there were 3 items that displayed a different pattern. Item 11, which measured confidence to choose lower calorie foods at restaurants, failed to meet the criteria of loading $> .40$ on one factor and no cross-loading of $\geq .32$ on any factor. Some researchers have suggested .32 as criterion for a “cross-loading” item (Tabachnick & Fidell, 2001). Also, item 8, which measured confidence to sit and watch TV less, and item 1, which measured confidence to reduce portion sizes at meals and snacks, appeared to load moderately on Factor 1, while also loading close to the .32 criteria on Factor 2.

Table 4: Pattern Matrix		
PANSE Item	Component	
	1	2
1. How confident are you that you can reduce your portion sizes at meals and at snacks each day?	.407	.292
2. How confident are you that you can increase the number of fruits and vegetables you eat daily?	.723	-.002
3. How confident are you that you can reduce the amount of butter and other fats or oils that you eat each day?	.770	.084
4. How confident are you that you can eat only a very small amount of fried foods like fried chicken, French fries, potato chips, and other fried foods each week?	.890	-.187
5. How confident are you that you can reduce or omit drinking sugary drinks like Kool-Aid, colas, sugared teas and coffee, or other sugared soft drinks?	.740	.006
6. How confident are you that you can reduce or omit fats (butter, fatty meats or oils) in cooking vegetables, beans, or frijoles?	.845	-.017
7. How confident are you that you can substitute lower calorie foods-like fruits, vegetables, or yogurt-for high calorie snacks-like cakes, pies, or ice cream?	.658	-.034
8. How confident are you that you can reduce the amount of time you sit and watch TV?	.508	.319
9. How confident are you that you can increase time spent in physical activity while at home, given your current family responsibilities?	.074	.874
10. How confident are you that you can increase time spent in physical activity by walking or other activities outside the home?	-.082	.942
11. How confident are you that you can select lower calorie foods at a fast food restaurant?	.481	.375

Summary

Several key findings emerged from the analyses. The alpha coefficient of .89 demonstrates sound internal consistency of the PANSE scale. The significant correlations, in the predicted directions, of the PANSE scale with other measures provide evidence of construct validity. Predictive validity tests reveal that the PANSE scale does not appear to predict weight loss at a 7-week follow-up with this sample. Although there were no statistically significant results found for the PANSE scale and drop out, the relationships are in the expected direction, and a larger sample may yield more meaningful results. The factor analysis results indicate items on the PANSE scale reflect two factors, one related to dietary behaviors and one related to physical activity behaviors, two aspects of weight loss. These factors contribute to the overall structure of the PANSE scale, and may be helpful in identifying underlying constructs of self-efficacy for weight loss behaviors.

Chapter 7: Discussion

The purpose of this study was to examine the psychometric properties of the Physical Activity and Nutrition Self-Efficacy scale in attempt to validate a new questionnaire for use with weight loss interventions. The findings indicate that the PANSE scale is a valid and reliable measure of self-efficacy for weight-loss behaviors within a group of low-income, multiethnic mothers.

Descriptive Results

Descriptive results showed an expected pattern: mean PANSE score increased from Time 1 to Time 2 for the Treatment group, but decreased for the Control group. Ideally, because of the nature of the intervention, individuals who receive the intervention content should display an increase in self-efficacy for weight loss. Alternately, assuming that members of the Control group were not participating in any other self-efficacy enhancing weight loss program, an increase in self-efficacy for weight-loss behaviors would not be expected.

Test-Retest Results

Test-retest results of the PANSE scale support the instrument's capability of producing similar results over a period of time when no intervention has been employed. However, due to the behavior-specific and dynamic nature of self-efficacy, the commonly reported test-retest reliability coefficient may not be suitable for a self-efficacy instrument (Resnick & Jenkins, 2000). As an individual's context changes, they

may feel more or less capable of performing certain behaviors. Pregnancy and motherhood are fluid time periods, as is life among low-income populations. Therefore, predicting self-efficacy outcomes over time may prove to be all the more difficult for the sample in the current study.

Internal Consistency

The Cronbach alpha, item-total statistics and alpha-if-deleted analyses conducted show strong internal consistency of the PANSE scale. This suggests that each of the 11 items that compile the PANSE scale assess the common construct of self-efficacy for weight loss behaviors.

Construct Validity

Correlations between PANSE and other measures displayed expected, significant relationships. The Self Care Inventory (SCI) is a measure of unhealthy behaviors, and previous research supports the negative correlation (those with higher SCI scores displayed lower PANSE scores) found in the current study between the SCI and PANSE scales. A meta-analysis that examined predictors of positive health practices notes a significant moderate effect size for self-efficacy as a predictor for positive health practices (Yarcheski, Mahon, Yarcheski, & Cannella, 2004). Another study that examined the correlation between a diabetes-related behavior self-efficacy scale and a modified self-care inventory to reflect diabetes-related behaviors, found a significant, positive relationship between the two scales. This indicates that individuals with diabetes, who felt more efficacious to engage in positive behaviors related to diabetes

care, also demonstrated more diabetes self-care behaviors (Weinger, Welch, Butler, & La Greca, 2005). Results from the present study, in conjunction with previous findings, indicate a relationship between self-efficacy for weight-loss and frequency of other health behaviors.

The Perceived Stress Scale (PSS) is a measure of an individual's recent life stressors. In the current study, results show that higher scores on the PSS correlate with lower scores on the PANSE scale. In other words, those women who felt more stress also felt less efficacious to engage in weight loss behaviors. Previous research shows similar patterns among other populations, thus strengthening the results found in this study. Among a group of participants in a diabetes prevention program, most of whom were overweight or obese, lower perceived stress and higher exercise self-efficacy were significantly correlated with increased physical activity at 1-year and end-of-study follow-up (mean time 2.8 years) (Delahanty, Conroy, & Nathan, 2006). Increased physical activity is a weight-loss related behavior assessed in the PANSE scale, therefore, a similar relationship to that which Delahanty and colleagues found was expected in the current study. Also in support of the current findings, Foreyt and colleagues (1995) report that weight "fluctuators" report higher stress and lower eating self-efficacy than "non-fluctuators," regardless of their current weight status.

The Decisional Balance Inventory (DBI) is comprised of pros and cons of weight loss and assesses an individual's level of each. In the current study, it was hypothesized that women who identified more pros (and therefore had higher DBI scores) with weight loss would also demonstrate a higher self-efficacy for weight loss behaviors. This hypothesis was confirmed in the results and has been documented by others. Another

weight-loss intervention utilized the Transtheoretical Model, specifically the stages of change, with a group of women recruited from primary care physicians. Robinson and colleagues report an increase in the pros and self-efficacy for physical activity, as well as a decrease in cons, with each stage of change progression in the group of overweight or obese women (Robinson *et al.*, 2008). Additionally, pros and self-efficacy for eating more fruits, vegetables, and fiber increased with increasing stage of change among the same group.

Another study found similar results among a population consisting predominantly of older, white females. A significant, positive correlation between self-efficacy for physical activity and stage of change was found, indicating that individuals who felt more efficacious to engage in physical activity were also more likely to have been regularly active for a longer time period (Cox, Stimpson, Poole, & Lambur, 2003). Also, a significant, positive relationship between DBI scores (indicating more pros for physical activity) and stage of change was noted, where individuals who had higher DBI scores showed an increase in their stage of change relating to activity.

Predictive Validity: Baseline PANSE and Weight Change

We hypothesized that there would be a negative correlation with self-efficacy and weight change, where participants who had higher baseline PANSE scores would show a greater weight loss at Time 2 (weight difference = weight at time 2 – weight at time 1). Although this has proven to be a sound form of predictive validity in the past (Glynn & Ruderman, 1986; Bernier & Avard, 1986), we did not find the expected results. Strecher, DeVellis, Becker, and Rosenstock (1986) reviewed research relating to self-efficacy and

health behavior change and also concluded that self-efficacy enhancement is related to ensuing health behavior change. The conflicting results found in the current study may be due to the dynamic nature of self-efficacy. Because self-efficacy is likely to change over time, it may mirror changes in other outcomes, rather than predicting them. Our results bolster the idea that self-efficacy enhancement and behavior modification are parallel changes. Another explanation may be the small sample size in this study, thus greater predictive validity may become apparent with a larger group.

Previous research has found self-efficacy to be unrelated to weight loss in the context of an intervention (Fontaine & Cheskin, 1997). Bernier and Avard (1986) found similar results, and note that increases in self-efficacy during the treatment period did not correlate with weight loss during treatment, but did significantly correlate with weight loss at follow-up assessments. One explanation for this outcome is posed by Nothwehr (2008): Although weight loss may be commonly used as an indicator of dietary and/or activity behavioral changes, it is a more distal aspect in the behavior change process than other specific behaviors.

In a study that examined self-efficacy and weight change among low-income overweight or obese African-American women enrolled in a weight loss intervention came to a similar conclusion (Martin, Dutton, & Brantley, 2004). They report that higher levels of baseline self-efficacy were actually associated with weight *gain*. However, this same study found a significant, negative relationship between change in self-efficacy and weight loss. In other words, women who displayed improvements in weight-loss self-efficacy over the course of the intervention showed a pattern of weight loss. This pattern aligns with Bandura's proposed "mastery" mechanism of building self-efficacy; if an

individual experiences success with weight-loss related behaviors, they should feel more efficacious in the future to perform the same behaviors.

Martin and colleagues' results reinforce the assertions in the current study regarding the malleable quality of self-efficacy over time. They offer another suggestion for the lack of predictive results of baseline weight-loss self-efficacy. It is possible that the particular self-efficacy instrument used in that study (WEL) did not effectively tap into self-efficacy beliefs related to weight loss among this particular population. This is notable in the current study, given the similarities of the samples.

Another explanation about the lack of predictive power of the PANSE scale may be due to methodological issues. Eastman and Marzillier (1984) offer an interesting critique of Bandura's concept of self-efficacy. They believe that mastery experience (one way in which self-efficacy may be enhanced) and the construct of outcome expectations (another component of Social Cognitive Theory) are downplayed in discussions about self-efficacy. An individual may have difficulty assessing their confidence in certain situations if they a) have not previously experienced the situation and/or b) believe there are numerous outcomes to a given action. It may be easier for a person to accurately assess their capability to perform an action given a particular situation if they have encountered that situation before, and if they can identify only a few possible outcomes of their actions (Eastman & Marzillier, 1984). Bandura (1988b) acknowledges this by stating that people's prediction of their own performance in a given task will be less accurate if they have little experience with that specific task. Bandura postulates four different types of self-efficacy development can occur: mastery learning, vicarious experience, verbal persuasion, and physiological response. However, given the

arguments of Eastman and Marzillier, mastery experience may be necessary for an individual to correctly judge their capacity for a given behavior. Also, weight-loss is affected by numerous behaviors, and an individual may foresee countless outcomes for different scenarios. This may make it more difficult for a person to judge their true level of self-efficacy for a given circumstance.

The variability of self-efficacy over time may have an impact on how well the construct can predict a certain outcome. Gist and Mitchell (1992) claim that at any given measurement point, individuals must process many cues to assess their capabilities. These authors assert that the following aspects are to be considered when judging specific capability: (a) the amount of a particular resource that is needed to perform the task, (b) how much of a resource the individual has, (c) how various resources contribute to performance relative to other resources, and (d) the specific attributions that are made about causes of performance. Due to the dynamic nature of the population in the current study, this could contribute to the instability of weight-loss self-efficacy. These thoughts also correspond with Bandura's proposed "reciprocal determinism," an endless interaction between an individual, their environment, and their behavior, as a foundation of Social Cognitive Theory. For instance, if a woman is going through a period of income uncertainty, she may feel less efficacious about eating healthier foods due to the common idea that eating healthier is more expensive. However, at the next measurement period, she may feel less insecure about her income status, and therefore, may feel more efficacious to engage in healthy eating for weight loss. Congruent with the aforementioned idea of difficulty in accurate self-efficacy assessment is the thought that

“relative unpredictability of the task mean that a rational and considered appraisal of self-efficacy is virtually impossible to achieve,” (Eastman & Marzillier, 1984, p.227).

Predictive Validity: Baseline PANSE and Drop Out

A drop out was defined as a participant who did not have Time 2 weight data, and it was hypothesized that participants with higher PANSE scores at Time 1 would be less likely to drop out of the weight-loss intervention. Results from the current study did not show the predicted negative relationship between self-efficacy for weight loss and drop out, despite other researcher’s findings. Bernier and Avar (1986) report that participants who completed a 10-week weight-loss treatment and subsequent 6-week and 6-month follow-up data gatherings had higher levels of baseline self-efficacy than those who ultimately dropped out of the study prior to the 10-week period or who failed to complete the follow-up data.

However, the inability of self-efficacy to predict program attendance has been reported. Another study that examined various aspects of an obesity program for hospital employees found that pre-treatment self-efficacy did not significantly predict program attendance (Prochaska, Norcross, Fowler, Follick, & Abrams, 1992). In a population of 109 individuals in a medically supervised weight-loss program, self-efficacy for weight loss did not correlate with attendance (Fontaine & Cheskin, 1997). The only explanation offered by these authors is related to their particular self-efficacy instrument (WEL). This measure assesses an individual’s confidence in their ability to abstain from particular detrimental actions that may hinder weight loss. This is not the case with PANSE, though, because the majority of the 11 items ask a person’s confidence to

engage in positive behaviors for weight loss. Thus further possible explanations for the results reported in this study are necessary.

Again, small sample size is one reason we observed low predictive power of the PANSE scale and drop out. Another idea may be that the PANSE scale assessed a construct that was unrelated to how an individual may view intervention attendance. The items included in the PANSE scale were related to behaviors outside of the actual intervention (2-hour classes once weekly for 13 weeks), thus participants may have felt confident in performing those particular actions while feeling less efficacious to attend or by viewing participation as unrelated to performing the specific behaviors assessed. Because self-efficacy is behavior-specific, it may be inaccurate to use this particular construct in an attempt to predict any behavior other than that which is specifically being measured.

Factor Analysis

Factor analysis results rendered a 2-factor model, one factor that relates to dietary behavior for weight loss and another that relates to physical activity in the context of weight loss. Eight of the 11 items on the PANSE scale loaded highly ($>.40$) on only one factor and also loaded below $.3$ on the second factor, indicating that those questions were effectively assessing content regarding only one of the two factors. Items 1 and 11 appeared to cross-load on both factors, which may indicate several things. While these particular items loaded higher on Factor 1 (regarding dietary behaviors), there is still doubt as to whether or not these items are only measuring this underlying construct. Therefore, the items may need to be re-worded or deleted.

Item 8 also appeared to cross-load on Factors 1 and 2. This item asked the individual's confidence to spend less time sitting while watching TV. Interestingly, the item loaded highest on Factor 1 (regarding dietary behaviors), which may indicate a relationship between how an individual views eating habits and television viewing. Initially, it seems as though a sedentary behavior (TV watching) would correlate with the other items measuring activity. However, it is not unrealistic to find correlations between food and sedentary behaviors. Jeffery and French (1998) report that, among a group of women, those who watched more television also had a higher energy (caloric) intake. In this same sample, TV viewing and self-reported activity levels were unrelated.

Individuals are exposed to television advertisements for food, especially for fast food and snacks, without comparable frequency of healthy food ads (Henderson & Kelly, 2005). Additionally, eating while watching television has become commonplace, whether it be snacking while viewing or eating meals with the family in front of the TV. These habits have been linked to an increased total daily caloric intake (Gore, Foster, DiLillo, Kirk, & West, 2003; Stroebele & de Castro, 2004). Therefore, people may make associations with food and television, and may find it difficult to either abstain from food intake whilst watching, or monitor the foods that they eat while viewing. Perhaps individuals associate fast food with television viewing, and therefore may feel less efficacious to decrease fast food intake *and* time spent watching TV.

Strengths, Limitations, and Future Directions

Strengths of the study include the sample of a diverse group of low-income women, which is a population underrepresented in research. Additionally, we had

follow-up data on a large portion of the sample, which allowed for adequate instrument reliability and validity testing. This particular scale development and validation has not previously been examined, thus conclusions from the current study can provide insight for future scale development and evaluation.

The small sample size was a major limitation of this study, and did not allow for powerful results in some analyses, or permit subgroup analyses within ethnicity. Future studies should have a larger total sample, allowing for larger numbers of participants within each ethnic group, so that ethnic differences may be explored. Another limitation of this study is the original development of the PANSE scale. Time did not permit for extensive inspection and testing of the original PANSE item pool. Additional analyses and preliminary testing may have provided stronger individual items, and, in turn, strengthened the overall scale.

Traditional test-retest analyses may not be appropriate for measures of self-efficacy because of the dynamic characteristics of the construct, thus alternate forms of reliability estimates may provide a more accurate view of the stability of the measure over time. McArdle and Woodcock (1997) note that use of traditional test-retest methods may show lower correlations with measures of traits that change over time. Another possibility might be following Resnick & Jenkins (2000) who utilized structural equation modeling to obtain an R^2 that served as the reliability estimate in their examination of an exercise self-efficacy scale. Also, further validation tests, such as confirmatory factor analyses (CFA), may illuminate additional information about the underlying structure of the PANSE scale and how it may be improved. Netemeyer (2003) recommends CFA for further evidence of internal consistency and validity of a scale. Cognitive interviewing

has been suggested for improving nutrition-related instruments, especially among low-income populations, because the process elicits feelings and ideas regarding scale items (Carbone, Campbell, & Honess-Morreale, 2002). Conducting this type of interview to determine the meaning of each existing PANSE item could improve precision.

Further examination of the psychometric properties of PANSE should also include validity tests with other measures. A measure of diet history, which may reflect the concept of building self-efficacy through mastery experience, can provide further validation of the PANSE scale. Also, a measure for readiness for weight loss would be helpful in explaining differences in individual's self-efficacy for weight loss. Incorporating a readiness measure might allow for further explanations into the lack of predictive power of self-efficacy for weight loss and attendance.

Future directions might include further refinement of the wording related to food and activity questions so that ethnic nuances, present in some groups, may be reflected. Additionally, longitudinal studies that examine the predictive power of self-efficacy and long-term weight loss may shed light on the complex relationship.

Overall the PANSE scale is a sound measure for activity and eating self-efficacy for weight loss among a group of multiethnic, low-income women during their first year postpartum. The scale proved to be reliable, valid, and parsimonious, and may be confidently used in future weight-loss research. Given the lack of validated self-efficacy instruments for weight-loss among this population, the Physical Activity and Nutrition Self-Efficacy scale contributes to obesity-related research.

Appendix A



SCHOOL OF NURSING
THE UNIVERSITY OF TEXAS AT AUSTIN

1700 Red River • Austin Texas 78701-1499 • (512) 471-7311 • FAX (512) 471-4910

April 17, 2009

Lara Latimer
lal1981@yahoo.com

Dear Lara:

I am writing to support your thesis project, Self-efficacy for weight loss among multi-ethnic, low-income women: A psychometric evaluation. As we have discussed, you have my permission to use the dataset from the R21 for psychometric evaluation of the Physical Activity and Nutrition Self Efficacy (PANSE) scale that Dr. Bobbie Sterling and I developed for the R21. The analyses that you outlined in the proposal that you sent to me are psychometric in nature and do not overlap with the main analyses of the grant aims, which will be addressing treatment and control group differences and before-after changes in the mail-intervention group on key weight and related variables.

Since Dr. Sterling and I are developers of the PANSE, we would appreciate having the opportunity after your thesis work is completed to participate in any outcomes to which we might make a substantive contribution, such as presentations and possible publication. However, the sample size may be insufficient for publication for anything other than a conference paper or a brief report.

Good luck in your work!

Sincerely,

A handwritten signature in cursive script, appearing to read "Bobbie Sterling".

Appendix B

How confident are you that you can do each of the behaviors listed below as part of a program to lose the baby weight? Circle the number that best described how confident you feel.

1. How confident are you that you can reduce your portion sizes at meals and at snacks each day?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

2. How confident are you that you can increase the number of fruits and vegetables you eat daily?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

3. How confident are you that you can reduce the amount of butter and other fats or oils that you eat each day?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

4. How confident are you that you can eat only a very small amount of fried foods like fried chicken, French fries, potato chips, and other fried foods each week?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

5. How confident are you that you can reduce or omit drinking sugary drinks like Kool-Aid, colas, sugared teas and coffee, or other sugared soft drinks?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

6. How confident are you that you can reduce or omit fats (butter, fatty meats or oils) in cooking vegetables, beans, or frijoles?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

7. How confident are you that you can substitute lower calorie foods—like fruits, vegetables, or yogurt—for high calorie snacks—like cakes, pies, or ice cream?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

8. How confident are you that you can reduce the amount of time you sit and watch TV?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

9. How confident are you that you can increase time spent in physical activity while at home, given your current family responsibilities?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

10. How confident are you that you can increase time spent in physical activity by walking or other activities outside the home?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

11. How confident are you that you can select lower calories foods at a fast food restaurant?

1	2	3	4	5	6	7	8	9
Not at all		Slightly		Moderately		Very much		Completely

References

- Ball, K. & Crawford, D. 2006. An investigation of the psychological, social and environmental correlates of obesity and weight gain in young women. *International Journal of Obesity*. 30, 1240-1249.
- Bandura, A. 1977. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*. 84, 191-215.
- Bandura, A. 1986. *Social foundations of thought and action: A social cognitive theory*. Englewoods Cliffs, NJ: Prentice Hall.
- Bandura, A. 1988b. Reflection on nonability determinants of competence. In R. J. Sternberg & J. Kolligian, Jr. (Eds.), *Competence considered: Perceptions of competence and incompetence across the lifespan*: 315-362. New Haven, CT: Yale University Press.
- Bandura, A. 1994. Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* 4, 71-81. New York: Academic Press.
- Bandura, A. 2006. *Self-Efficacy Beliefs of Adolescents*. Chapter 14: Guide for Constructing Self-Efficacy Scales. Charlotte, NC: Information Age Publishing.
- Bernier, M. & Avar, J. 1986. Self-Efficacy, Outcome, and Attrition in Weight Reduction Program. *Cognitive Therapy and Research*. 10 (3), 319-338.
- Carbone, E.T., Campbell, M.K., & Honess-Morreale, L. 2002. Use of cognitive interview techniques in the development of nutrition surveys and interactive nutrition messages for low-income populations. *J Am Diet Assoc*. 102, 690-696.
- Centers for Disease Prevention and Control. Pediatric and Pregnancy Surveillance System. 2007. Retrieved June 28, 2009 from: <http://www.cdc.gov/pednss/index.htm>.
- Chang, M., Nitzke, S., Brown, R., Baumann, L., & Oakley, L. 2003. Development and Validation of a Self-Efficacy Measure for Fat Intake Behaviors of Low-Income Women. *J Nutr Educ Behav*. 35, 302-307.
- Chang, M., Brown, R., Nitzke, S. 2008. Scale development: factors affecting diet, exercise, and stress management (FADESM). *BMC Public Health*. 26 (8), 76.

- Chang, M., Brown, R., Baumann, L., & Nitzke, S. 2008. Self-efficacy and Dietary Fat Reduction Behaviors in Obese African-American and White Mothers. *Obesity*. 16 (5), 992-1001.
- Clark, M.M., Abrams, D.B., Niaura, R.S., Eaton, C.A., & Rossi, J.S. 1991. Self-efficacy in weight management. *Journal of Consulting and Clinical Psychology*. 59, 739–744.
- Cohen, S. & Williamson, G. 1988. Perceived stress in a probability sample of the United States. In S. Spacapan & S. Oskamp (Eds.) *The Social Psychology of Health* (pp. 31-67). Newbury Park, CA: Sage.
- Cook, D.A. & Beckman, T.J. 2006. Current Concepts in Validity and Reliability for Psychometric Instruments: Theory and Application. *The American Journal of Medicine*. 119(2), 166.e7-16.
- Cox, R.H., Stimpson, T.S., Poole, K.P., & Lambur, M.T. 2003. Physical Activity Characteristics of Potential Participants in Nutrition and Fitness Programs Based on Stages of Change, Self-Efficacy, and Decisional Balance. *Family and Consumer Sciences Research Journal*. 31, 361.
- DeNaei, G., Ding, E.L., Mozaffarian, D., Taylor, B., Rehm, J., Murray, C.J.L., & Ezzati, M. 2009. The Preventable Causes of Death in the United States: Comparative Risk Assessment of Dietary, Lifestyle, and Metabolic Risk Factors. *PLoS Med*. 6(4).
- Delahanty, L.M., Conroy, M.B., Nathan, D.M., & The Diabetes Prevention Program Research Group. 2006. Psychological Predictors of Physical Activity in the Diabetes Prevention Program. *J Am Diet Assoc*. 106, 698-705.
- Dennis, K.E., & Goldberg, A.P. 1996. Weight control self-efficacy types and transitions affect weight-loss outcomes in obese women. *Addictive Behaviors*. 21 (I), 103-116.
- DeVellis, R.A. 1991. Scale Development: Theory and Applications. Newbury Park, CA: SAGE Publications.
- Downing, S.M. 2003. Validity: on the meaningful interpretation of assessment data. *Med Educ*. 37, 830-837.
- Eastman, C. & Marzillier, J.S. 1984. Theoretical and Methodological Difficulties in Bandura's Self-Efficacy Theory. *Cognitive Therapy and Research*. 8(3), 213-229.

- Eyler, A., Matson-Koffman, D., Rohm Young, D., Wilcox, S., Wilbur, J., Thompson, J., Sanderson, B., & Evenson, K. 2003. Quantitative Study of Correlates of Physical Activity in Women from Diverse Racial/Ethnic Groups: The Women's Cardiovascular Health Network Project Summary and Conclusions. *Am J Prev Med.* 25(3Si), 93–103.
- Field, A.E., Coakley, E.H., Must, A., Spadano, J.L., Laird, N., Dietz, W.H., Rimm, E., & Colditz, G.A. 2001. Impact of Overweight on the Risk of Developing Common Chronic Diseases During a 10-Year Period *Arch Intern Med.* 161, 1581-1586.
- Finkelstein, E., Fiebelkorn, I., & Wang, G. 2003. National medical expenditures attributable to overweight and obesity: how much and who's paying? *Health Aff. W3*, 219–26.
- Floyd, F.J., & Widaman, K.F. 1995. Factor Analysis in the Development and Refinement of Clinical Assessment Instruments. *Psychological Assessment.* 7 (3), 286-299.
- Fontaine, K.R. & Cheskin, L.J. 1997. Self-Efficacy, Attendance, and Weight Loss in Obesity Treatment. *Addictive Behaviors.* 22 (4), 567-570.
- Foreyt, J.P., Brunner, R.L., Goodrick, G.K., Cutter, G., Brownell, K.D., St. Jeor, S.T. 1995. Psychological correlates of weight fluctuation. *International Journal of Eating Disorders.* 17(3), 263-275.
- Gist, M.E. & Mitchell, T.R. 1992. Self-Efficacy: A Theoretical Analysis of Its Determinants and Malleability. *The Academy of Management Review.* 17(2), 183-211.
- Glynn, S.M. & Ruderman, A.J. 1986. The development and validation of an Eating Self Efficacy Scale. *Cognitive Therapy and Research.* 10(4),403-420.
- Gore, S.A., Brown, D.M., & Smith-West, D. 2003. The Role of Postpartum Weight Retention in Obesity Among Women: A Review of the Evidence. *Ann Behav Med.* 26(2),149-159.
- Gore, S.A., Foster, J.A., DiLillo, V.G., Kirk, K., & West, D.S. 2003. Television viewing and snacking. *Eating Behaviors.* 4(4), 399-405.
- Gunderson, E.P. & Abrams, B. 2000. Epidemiology of gestational weight gain and body weight changes after pregnancy. *Epidemiologic Reviews.* 22, 261–274.
- Haynes, S.N., Richard, D.C.S., & Kubany, E. 1995. Content validity in Psychological Assessment: A Functional Approach to Concepts and Methods. *Psychological Assessment.* 7(3), 238-247.

- Hedly, A.A., Ogden, C.L., Johnson, C.L., Carroll, M.D., Curtin, L.R., & Flegal, K.M. 2004. Prevalence of Overweight and Obesity Among U.S. Children, Adolescents, and Adults, 1999-2002. *JAMA*. 291(23), 2847-50.
- Henderson, V.R. & Kelly, B. 2005. Food Advertising in the Age of Obesity: Content Analysis of Food Advertising on General Market and African American Television. *J Nutr Educ Behav*. 37, 191-196.
- Institute of Medicine. 1990. *Nutrition During Pregnancy*. Washington, D.C.: The National Academies Press.
- Institute of Medicine. 2009. *Weight Gain During Pregnancy: Reexamining the Guidelines*. Washington, D.C.: The National Academies Press.
- Jeffery, R.W. & French, S.A. 1998. Epidemic Obesity in the United States: Are Fast Foods and Television Viewing Contributing? *American Journal of Public Health*. 88 (2), 277.
- Kac, G., Benicio, M., Velasquez-Melendez, G., Valente, J.G., & Struchiner, C.J. 2004. Gestational Weight Gain and Pre-pregnancy Weight Influence Postpartum Weight Retention in a Cohort of Brazilian Women. *The Journal of Nutrition*. 134(3), 661-666.
- Keppel, K. & Taffel, S. 1993. Pregnancy-Related Weight Gain and Retention: Implications of the 1990 Institute of Medicine Guidelines. *American Journal of Public Health*. 83 (8), 1100-3.
- Kristal, A.R., Shattuck, A.L., & Henry, H.J. 1990. Patterns of dietary behavior associated with selecting diets low in fat: reliability and validity of a behavioral approach to dietary assessment. *J Am Diet Assoc*. 90,214-220.
- Krummel, D., Semmens, E., Boury, J., Gordon, P.M., & Larkin, K. 2004. Stages of Change for Weight Management in Postpartum Women. *J Am Diet Assoc*. 104, 1102-1108.
- Laffrey, S.C. & Asawachaisuwikrom, W. 2001. Development of an exercise self-efficacy questionnaire for older Mexican American women. *J Nurs Meas*. 9(3), 259-73.
- Larsen, J.K., Geenen, R. 2000. The Obesity Psychosocial State Questionnaire (OPSQ). Internal Publication.
- Linne, Y., Dye, L., Barkeling, B., & Rossner, S. 2003. Weight development over time in parous women—The SPAWN study—15 years follow-up. *International Journal of Obesity*. 27, 1516–1522.

- Manson, J.E., Willet, W.C., Stampfer, M.J., Colditz, G.A., Hunter, D.J., Hankinson, S.E., Hennekens, C.H., & Speizer, F.E. 1995. Body Weight and Mortality Among Women. *N Engl J Med.* 333, 677-85.
- Marcus, B.H., Selby, V.C., Niaura, R.S., & Rossi, J.S. 1992. Self-efficacy and the stages of exercise behavior change. *Research quarterly for exercise and sport.* 63(1), 60-66.
- Martin, P.D., Dutton, G.R., & Brantley, P.J. 2004. Self-efficacy as a predictor of weight change in African-American women. *Obes Res.* 12(4), 646-651.
- Masse, L.C., Heesch, K.C., Eason, K.E., Wilson, M. 2006. Evaluating the properties of a stage-specific self-efficacy scale for physical activity using classical test theory, confirmatory factor analysis and item response modeling. *Health Education Research.* 21 (Supplement 1), Theory & Practice Pages i33-i46.
- McArdle, J.J., & Woodcock, R.W. 1997. Expanding Test-Retest Designs to Include Developmental Time-Lag Components. *Psychological Methods.* 2(4), 403-435.
- McLaren, L. 2007. Socioeconomic Status and Obesity. *Epidemiol Rev.* 29, 29-48.
- Messick, S. 1989. Validity In: Linn RL, editor. *Educational Measurement, 3rd Ed.* The American Council on Education/Macmillan series on higher education. (pp. 13-103). New York, NY, England: Macmillan Publishing Co, Inc; American Council on Education. xiv, 610.
- Murphy, J.M., Horton, N.J., Burke, J.D., Monson, R.R., Laird, N.M., Lesage, A., & Sobol, A.M. 2009. Obesity and weight gain in relation to depression: findings from the Stirling County Study. *International Journal of Obesity.* 33, 335-341.
- National Health And Nutrition Examination Survey. U.S. Department of Health and Human Services. Centers for Disease Control and Prevention. Prevalence of Overweight and Obesity Among Adults-United States, 2003-2004. Page last reviewed September 9, 2008. Retrieved March 16, 2009.
- Netemeyer, R., Bearden, W., & Sharma, S. 2003. Scaling Procedures: Issues and Applications. Sage Publications, California.
- Norbeck, J.S. 1985. What constitutes a publishable report of instrument development? *Nursing Research.* 34, 380-382.
- Nothwehr, F. 2008. Self-Efficacy and its Association with Use of Diet-Related Behavioral Strategies and Reported Dietary Intake. *Health Educ Behav.* 35, 698.

- Nunnally, J.C., & Bernstein, I.H. 1994. *Psychometric theory* (3rd ed.). New York: McGraw-Hill.
- O'Connell, D. & Velicer, W.F. 1988. A decisional balance measure and the stages of change model for weight loss. *Int J Addict.* 23, 729-750.
- Ogden, C.L., Carroll, M.D., McDowell, M.A., & Flegal, K.M. 2007. Obesity among adults in the United States—no change since 2003–2004. NCHS data brief no 1. Hyattsville, MD: National Center for Health Statistics.
- Ohlin, A. & Rossner, S. 1990. Maternal body weight development after pregnancy. *International Journal of Obesity.* 14, 159-173.
- Palmeira, A.L., Teixeira, P.J., Branco, T.L., Martins, S.S., Minderico, C.S., Barata, J.T., Serpa, S.O., & Sardinha, L.B. 2007. Predicting short-term weight loss using four leading health behavior change theories. *International Journal of Behavioral Nutrition and Physical Activity.* 4, 1-14.
- Pardine, P. (n. d.). *The Self Care Inventory: Assessment of health-impairing behaviors.* (Available from Peter Pardine, PhD, New York Institute of Technology, Center for Engineering and Technology, Old Westbury, NY 11568.
- Parker, J.D. & Abrams, B. 1993. Differences in postpartum weight retention between black and white mothers. *Obstet Gynecol.* 81(5(Pt 1)), 768-774.
- Prochaska, J.O., Norcross, J.C., Fowler, J.L., Follick, M.J., and Abrams, D.B. 1992. Attendance and outcome in a work site weight control program: Processes and stages of change as process and predictor variables. *Addictive Behaviors.* 17, 35–45.
- Puhl, R.M. & Brownell, K.D. 2001. Bias, Discrimination, and Obesity. *Obesity Research.* 9 (12), 788-805.
- Puhl, R.M. & Brownell, K.D. 2006. Confronting and Coping with Weight Stigma: An Investigation of Overweight and Obese Adults. *Obesity.* 14 (10), 1802–1815.
- Puhl, R.M., Moss-Racusin, C.A., Schwartz, M.B., & Brownell, K.D. 2008. Weight stigmatization and bias reduction: perspectives of overweight and obese adults. *Health Education Research.* 23(2), 347-58.
- Resnick, B. & Jenkins, L.S. 2000. Testing the Reliability and Validity of the Self Efficacy for Exercise Scale. *Nursing Research.* 49(3), 154-159.

- Resnick, B., Luisi, D., Vogel, A., & Junaleepa, P. 2004. Reliability and Validity of the Self-Efficacy for Exercise and Outcome Expectations for Exercise Scales with Minority Older Adults. *Journal of Nursing Measurement*. 12(3) 235-47.
- Roberti, J.W., Harrington, L.N., & Storch, E.A. 2006. Further Psychometric Support for the 10-Item Version of the Perceived Stress Scale. *Journal of College Counseling*. 9, 135-147.
- Robinson, A.H., Norman, G.J., Sallis, J.F., Calfas, K.J., Rock, C.L., Patrick, K. 2008. Validating stage of change measures for physical activity and dietary behaviors for overweight women. *International Journal of Obesity*. 32, 1137-1144.
- Rooney, B.L. & Schauburger, C.W. 2002. Excess Pregnancy Weight Gain and Long Term Obesity: One Decade Later. *Obstet Gynecol*. 100, 245-52.
- Rossner, S. & Ohlin, A. 1995. Pregnancy as a risk factor for obesity: lessons from the Stockholm Pregnancy and Weight Development Study. *Obes Res. Suppl* 2:267s275s.
- Saunders, R., Pate, RR., Felton, G.M., Dowda, M., Weinrich, M.C., Ward, D.S., Parsons, M.A., Baranowski, T. 1997. Development of questionnaires to measure influences on children's physical activity. *Prev Med*. 26, 241-247.
- Shaughnessy, M., Resnick, B.M., & Macko, R.F. 2004. Reliability and validity testing of the short self-efficacy and outcome expectation for exercise scales in stroke survivors. *Journal of Stroke and Cerebrovascular Disease*. 13(5), 214-219.
- Shrewsbury, V.A., Robb, K.A., Power, C., & Wardle, J. 2009. Socioeconomic Differences in Weight Retention, Weight-related Attitudes and Practices in Postpartum Women. *Matern Child Health J*. 13(2), 231-240.
- Smith, D.E., Lewis, C.E., Caveny, J.L., Perkins, L.L., Burke, G.L., & Bild, D.E. 1994. Longitudinal changes in adiposity associated with pregnancy. The CARDIA study. *Journal of the American Medical Association*. 271,1747-1751.
- Stich, C., Knauper, B., & Tint, A. 2009. A Scenario Based Dieting Self-Efficacy Scale, The DIET-SE. *Assessment*. 16(1), 16-30.
- Strecher, V.J., DeVellis, B.M., Becker, M.H., & Rosenstock, I.M. 1986. The role of self efficacy in achieving health behavior change. *Health Education Quarterly*. 13(1), 73-92.
- Stroebele, N. & de Castro, J.M. 2004. Television viewing is associated with an increase in meal frequency in humans. *Appetite*. 42,111-113.

- Tabachnick, B.G., & Fidell, L.S. 2001. Using multivariate statistics (4th ed.). New York: Harper & Row.
- Townsend, M. & Kaiser, L. 2005. Development of a Tool to Assess Psychosocial Indicators of Fruit and Vegetable Intake for 2 Federal Programs. *J Nutr Educ Behav.* 37,170-184.
- U.S. Department of Health and Human Services. 2000. The Practical Guide to the identification, evaluation, and treatment of overweight and obesity in adults. Bethesda, MD, NIH-National Heart, Lung, and Blood Institute
- U.S. Department of Health and Human Services, 2008. Health Resources and Services Administration, Maternal and Child Health Bureau. *Women's Health USA 2008*. Rockville, Maryland: U.S. Department of Health and Human Services.
- Vartanian, L.R. & Shaprow, J.G. 2008. Effects of Weight Stigma on Exercise Motivation and Behavior: A Preliminary Investigation among College-aged Females. *J Health Psychol.* 13, 131.
- Walker, L.O. 1996. Predictors of Weight Gain at 6 and 18 Months After Childbirth: A Pilot Study. *JOGNN.* 25, 39-48.
- Walker, L.O. 1999. Factors related to new mothers' readiness to manage weight. *American Journal of Health Behavior.* 23, 268-279.
- Walker, L.O., Freeland-Graves, J.H., Milani, T., Hanss-Nuss, H., George, G., Sterling, B.S., Kim, M., Timmerman, G.M., Wilkinson, S., Arheart, K.L., Stuijbergen, A. 2004. Weight and behavioral and psychosocial factors among ethnically diverse, low-income women after childbirth. I. Methods and context. *Women & Health.* 40(2), 1 – 17.
- Wamsteker, E.W., Geenen, R., Iestra, J., Larsen, J.K., Zelissen, P.M.J., & Van Stavern, W.A. 2005. Obesity-Related Beliefs Predict Weight Loss after an 8-Week Low-Calorie Diet. *J Am Diet Assoc.* 105, 441-444.
- Wang, Y., Beydoun, M.A., Liang, L., Caballero, B., & Kumanyika, S.K. 2008. Will All Americans Become Overweight or Obese? Estimating Progression and Cost of the US Obesity Epidemic. *Obesity.* 16(10), 2323–2330.
- Weinger, K., Welch, G.W., Butler, H.A., & La Greca, A.M. 2005. Measuring Diabetes Self-Care A psychometric analysis of the Self-Care Inventory-revised with adults. *Diabetes Care.* 28,1346–1352.

Yarcheski, A., Mahon, N.E., Yarcheski, T.J., & Cannella, B.L. 2004. A Meta-Analysis of Predictors of Positive Health Practices. *Journal of Nursing Scholarship*. 36(2), 102-108.

Vita

Lara Latimer was born September 17, 1981 in Lubbock, Texas. Her parents, Dr. James Bell and Rosa Latimer-Bell reside in Post, Texas. Lara earned a Bachelors of Science degree in Exercise and Sports Science from Texas Tech University in August 2003. Lara currently has one article in publication that will be in print in the Fall of 2009. The citation is as follows: Sterling, B. S., Fowles, E. R., Garcia, A. A., Jenkins, S. K., Wilkinson, S., Kim, M., Kim, S., Latimer, L., & Walker, L.O. (2009). Altered perceptions of personal control about retained weight and depressive symptoms in low-income postpartum women. *Journal of Community Health Nursing*, 26:1-15.

Permanent address: 115 South Ave N, Post, TX, 79356

This thesis was typed by Lara Latimer.